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To: BDCP.comments@noaa.gov
Subject: Comment from the Davis Chapter of the Society for Conservation Biology
Attachments: UCdavis-BDCPletter.doc

Please see attached comment on the Bay Delta Conservation Plant from the Davis Chapter of the Society for Conservation Biology.

Thank you
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Society for Conservation Biology, Davis Chapter, Public Comment on the Bay Delta Conservation Plan (BDCP)

The Society for Conservation Biology, Davis Chapter, would like to endorse the planned restoration in the Bay Delta Conservation Plan (BDCP) (BDCP Chapter 3), but recommends the plan as a whole increase its capacity to respond to the uncertainties inherent in restoration activities. We would also like to see restoration of a more natural hydrograph and prioritization of the most highly degraded areas. We identified 4 main areas needing improvement and include science-based recommendations to better ensure restoration will achieve desired outcomes for the area's aquatic biodiversity and imperiled species.

I. Uncertainty in Restoration

While the BDCP proposes expansive restoration (BDCP Chapter 3), it is overly optimistic about its ability to accurately predict the initial and long-term consequences of restoration (BDCP 3.1.3.3). Ecosystem restoration does not always proceed along a predictable "trajectory" (Zedler and Callaway 1999). Temporal variation can often influence the outcome of restoration work, making the results of any one study difficult to generalize (Vaughn and Young 2010). The BDCP should do more to acknowledge this uncertainty inherent in all restoration work.

As a specific example, the BDCP assumes that restoring tidal marsh will produce food inputs to open waters where the delta and long-fin smelts reside (BDCP 3.4.4). However, whether food originating in the tidal marsh will adequately supplement open water resources remains an unanswered question. Other organisms in the tidal marsh, such as native microzooplankton and clams, may eat much of the additional food (e.g., Lopez et al. 2006). The BDCP in fact acknowledges that invasive clams may eat phytoplankton in the tidal marshes, but then does not discuss how this will affect restoration results. While such uncertainties do not guarantee that the proposed restoration will not benefit the smelts and other species, these unanswered questions do demonstrate unequivocally that the BDCP should better prepare for unexpected restoration outcomes. The BDCP needs to more thoroughly incorporate both uncertainty and the best available scientific information into its restoration programs. In its development of an adaptive management plan, the BDCP has recognized some uncertainty in its restoration practices (BDCP 3.1.3). However, further steps can be taken to increase the flexibility of the adaptive management plan and mitigate the potential for failing to reach restoration goals by including back-up restoration plans from the beginning.

II. Needed improvements to adaptive management plan

While we applaud inclusion of adaptive management in the BDCP (BDCP 3.1.3, 7.1.6), adaptive management is seldom used effectively due to poor understanding of the uncertainty involved, leadership problems, bureaucratic hurdles, and lack of resources (Walters 2007). In the Delta, the multitude of agencies with overlapping jurisdictions, strict control of water flows, and slow processes involved in enacting change (Mount et al 2013) mean that appropriate responses to adaptive management experiments may be impossible. No management action should be undertaken without scientific support. However, lengthy studies are often extended simply because they are cheaper and more politically feasible than action (Lund 2012). The planned Adaptive Management Team should have greater power to act independently with the same level of authority as the Authorized Entity Group (BDCP 7.1.3). It should also coordinate the sharing of existing resources and scientific data between agencies.

Adaptive management is generally a mechanism for dealing with uncertainty in management outcomes. However, in Chapter 6.4 of BDCP, the plan specifies that in the event of unforeseen circumstances USFWS and NMFS cannot place any new restrictions on land or water use. While the "no surprises rule" and associated financial assurances are understandable incentives for stakeholder agreement (BDCP 6.4.1), water restrictions may be the only mechanism to protect endangered species in the event of extreme drought (Moyle et al 2012). To maximize the chances that the plan meets its restoration goals, a mechanism will be needed to re-negotiate water contracts should unforeseen circumstances jeopardize success.

III. Restoration of the Natural Hydrograph and Flow

Flow regime is considered the primary determinant of the structure and function of aquatic ecosystems (Bun and Arthington 2002, Poff et al 2010). While the BDCP discusses the difference between the historical and current hydrograph (see BDCP 2.2.1 and 2.3.3.3), it does not focus on the restoration of the natural hydrograph or increasing outflows from the Delta (see BDCP 5.3.1). Delta water exports and diversions have increased dramatically since the 1950s and 1960s when export facilities were constructed (Healey et al. 2008). A north Delta pumping

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station will reduce the flow reversal and saltwater intrusion caused by the south Delta station location (BDCP 5C.5.3.8). Currently, in times of low flow, saltwater from the estuary gets pulled back towards the south Delta pumps due to proximity and lack of freshwater outflow. Despite this benefit of a north station, the BDCP has not addressed the potential issue that a north Delta station could reduce the outflow of water entering the central Delta from the Sacramento River (see discussion of Delta Outflow requirements in BDCP 5C.A.4.1.2, North Delta Intake Diversions in 5C.A.4.4, Simulated North Delta Intake Diversions in 5C.A.6.3.1, and Delta Outflow and X2 in 5C.A.4.16). The south Delta pumping station allows for all-of-the Sacramento River outflow to enter and pass through the Delta. Sufficient outflows are necessary to maintain water quality and to prevent saltwater intrusion (Herbold and Moyle 1989). Native fish communities are also associated with high river flows in the Delta, while nonnative species are more likely to thrive in low flow and warm water conditions (Feyrer and Healey 2003). A north Delta station will reduce Sacramento River outflows into the central Delta and potentially affect Delta water quality and fish communities.

In the Delta, the natural flow regime varies dramatically intra- and inter-annually. Increased outflow during the winter flooding and spring snowmelt pulse is an especially important cue for migratory fishes (del Rosario et al. 2013), which the BDCP minimally addresses in sections 5.5.4.2.2 and 5.5.3.2.1-2. Alteration of pulse flows will affect the outmigration ability of salmon smolts and the homing ability of spawning adult migrants. The BDCP addresses the issue of the location of the export diversions affecting migratory cues, but it does not address the overall reduction of spring pulses. By storing water upstream from winter rains and spring snowmelt and releasing it throughout the summer and early fall, the natural annual pattern of variation in flow, temperature, and salinity throughout the system is disrupted (Herbold and Moyle 1989). Mimicking the natural flow regime through changing timing of dam releases, even with a minimal increase in water export, has been shown to dramatically improve conditions for native species in California (Marchetti and Moyle 2001), and the same principle could be applied here. The BDCP does not sufficiently address the need to manage upstream dam releases to follow a natural hydrograph.

IV. Restoration priorities - the salt marsh harvest mouse

The BDCP claims that ecosystem enhancement actions will contribute to the recovery of state and federally protected species in the region (i.e. BDCP Executive Summary pp. 10, 36; 3.3-39; 3.3-58; 3.3-60). However, restoration and enhancement activities that benefit some species may have neutral, or even negative effects on others. For example, planned tidal restoration in the Suisun Marsh will most certainly benefit fish, but may or may not benefit the

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state and federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) as stated in the BDCP. While they are listed under "community" headings, many of the goals in the BDCP come down to "creating acres," with little specification as to how that links to the community (i.e. Conservation Measures 3 and 11; .3.3-9). With a "if you build it, they will come" outlook, the BDCP requires that adaptive management takes place during implementation, but does not outline alternatives to restoring tidal wetlands if this restoration does not have the desired effect. Furthermore, almost 50% of the tidal restoration proposed within the plan is slated to occur in Suisun Marsh. Most of the Suisun Marsh is already serving as suitable habitat for many species, so resources might be better used to improve poor quality habitat (Sustaita et al. 2011). A more logical conservation strategy for salt marsh harvest mice is to restore poor quality habitat such as old salt ponds, where there are clearly no mice present, than to restore diked wetlands that already support large populations of mice.

The BDCP proposes about 150,000 acres of habitat restoration and enhancement. Approximately 6,968 acres, 23% of all remaining potential salt marsh harvest mouse habitat, will be affected (Josselyn 1983, BDCP Executive Summary pp. 64). The BDCP acknowledges that restored tidal wetlands "could take decades" to mature and become suitable habitat for salt marsh harvest mice (BDCP 3.3-218). This means that almost 1/4 of the salt marsh harvest mouse habitat could be unusable by mice for dozens of generations. Additionally, almost 1,000 acres, more than 3% of remaining salt marsh harvest mouse habitat, will become subtidal and will be lost completely (BDCP Executive Summary pp. 64). Despite these drastic effects on salt marsh harvest mouse habitat, the monitoring requirements on salt marsh harvest mice are weak. The BDCP stipulates that monitoring take place within 6 months of enhancement actions (i.e. BDCP 3.D-23, -31). Six months could be up to 6 generations of mice or other species with short generation times (i.e. ADW 2014). If monitoring does not occur directly following activities it may be unclear whether negative effects, such as population bottlenecks, are taking place. Additionally, there is no pre-monitoring required, so there is no baseline to compare post-restoration monitoring to determine efficacy of restoration. Small mammal monitoring is time intensive, and it is important that is it undertaken correctly to evaluate the restoration and enhancement goals of the BDCP.

Finally, much of the BDCP, as it relates to the salt marsh harvest mouse, is based on untested assumptions. For instance, 6,100 acres of good quality diked wetlands are to be restored, with the assumption that tidal marshes are superior habitat for the salt marsh harvest mouse than diked wetlands. There are currently no data supporting this assumption. In the Species Account section of the plan the BDCP cites published data showing that salt marsh harvest mouse populations in diked wetlands can exceed those in tidal wetlands in the Suisun Marsh, yet claims that tidal restoration in Suisun will "substantially increase suitable habitat" in

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the Conservation Strategy section (BDCP 2A.14-2, 3.3-60; Sustaita et al. 2011). There are also more cost efficient and less risky options for tidal enhancement that are not explored in the plan, such as allowing muted tidal marshes to accrete without breaching levees, by simply leaving control gates open. Though it is not the fault of the writers of this plan that data on the salt marsh harvest mouse is lacking, putting this much emphasis on tidal restoration in the Suisun Marsh is a potentially dangerous gamble for the species.

While it cannot be denied that habitat enhancement will likely improve the ecosystem, it is clear that when it comes to the salt marsh harvest mouse, the literature used in the BDCP seems to have been cited selectively to build support for the mitigation goals that will allow water diversion plans to proceed. BDCP claims plan actions will benefit the salt marsh harvest mouse (i.e. BDCP Executive Summary pp. 10, 36; 3.3-39; 3.3-58; 3.3-60). However, those claims are based on untested assumptions. Before implementing costly restoration actions that may or may not benefit mice, numerous pilot studies need to be conducted, which the BDCP initially acknowledges, but does not develop in any detail. It should be understood that while the salt marsh harvest mouse may benefit from ecosystem improvement efforts outline in the BDCP, this is by no means guaranteed and it is unmerited to use the species as a flagship beneficiary.

Conclusion

Based on our review of the BDCP and the shortcomings identified herein, we recommend:

- Increased realization of the uncertainties in restoration practices (Chapter 3.1.3)
- A more structured and independent adaptive management team (Chapter 7.1.6)
- Consideration of timing and magnitude of flood events for restoration of a natural hydrograph
- The implementation of a more strategic restoration priorities with regards to the salt marsh harvest mouse (BDCP 2A.14-2, 3.3-60)
- A realization of the historical failures of habitat restoration and the incorporation of better management practices into the BDCP. (BDCP 6.4)

We offer our endorsement of the BDCP provided that the steps needed to ameliorate the above issues are met.

Sincerely

Society for Conservation Biology Davis Chapter

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